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EXAMINER	
PIGGUSH, AARON C	

ART UNIT	PAPER NUMBER
2838	

DATE MAILED: 08/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/717,207	FOWLER ET AL.	
	Examiner	Art Unit	
	Aaron Piggush	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-7,12,13 and 18-22 is/are rejected.

7)☒ Claim(s) 8-11 and 14-17 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 March 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 5/19/06.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7, 12, 13, 20, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Eaves (US 5,656,915).

With respect to claim 1, Eaves discloses a system for balancing state of charge among plural series connected electrical energy storage units, comprising:

a string of electrical energy storage units (no. 4a-4d in Fig. 1); and

a power converter selectively coupled to an individual storage unit of the string (col 16 ln 5-17), the power converter configured to transfer energy bidirectionally between the individual storage unit and the string of storage units (col 16 ln 7-11 and ln 53-56).

With respect to claim 2, Eaves discloses the system of claim 1, wherein the power converter transfers energy at a controllable rate of transfer (col 18 ln 35-42 and col 17 ln 25-31).

With respect to claim 3, Eaves discloses the system of claim 1, wherein the power converter monitors voltage and current data of the individual storage unit resulting from the transferring of energy (col 16 ln 37-52).

With respect to claim 4, Eaves discloses the system of claim 1, wherein the power converter transfers units of energy between the individual storage unit and the string of storage units (col 16 ln 53-56 and ln 10-13).

With respect to claim 5, Eaves discloses the system of claim 1, wherein the power converter comprises:

a primary inductor (no. 7p in Fig. 1);

a first secondary inductor magnetically coupled to the primary inductor (no. 7s in Fig. 1);

a first switch selectively coupling the individual storage unit to the primary inductor (no. 16e in Fig. 2a); and

the first secondary inductor coupling to an output capacitor (no. 8c in Fig. 1);

the output capacitor coupled in parallel to the string of storage units (no. 8c and 4a-4d in Fig. 1).

Additionally, when the first switch mentioned above selectively couples the individual storage unit to the primary inductor, the circuit will have another switch closed so that there will be a complete connection across the battery cell selected, as can be seen in Fig. 2a.

With respect to claim 6, Eaves discloses the system of claim 5, further wherein:

the power converter is further configured to transfer energy form the individual storage unit to charge the primary inductor when the first switch is on (col 13 ln 20-22); and

to discharge energy into the first secondary inductor to charge the output capacitor when the first switch is off, the output capacitor discharging energy to the string of storage units (col 13 ln 22-27).

With respect to claim 7, Eaves discloses the system of claim 5, further comprising:

a first pulse generator (no. 1 in Fig. 1) providing first enable signals to the first switch (no. 2 in Fig. 1, no. 27, 26a, 26c, and 26d in Fig. 3, and col 16 ln 21-37);

the first switch configured to couple the individual storage unit to the primary inductor (no. 16e in Fig. 2a is coupled to no. 7p in Fig. 1) in response to the first enable signals, transferring energy from the individual storage unit to the string of storage units (col 16 ln 7-11 and ln 53-56 and col 13 ln 22-27).

Furthermore, the microcontroller acts as a pulse generator because it generates a pulse signal to the MUX and the driver, which in turn force the MOSFET switches of the device to turn on or off and connect the storage unit or units to the inductor.

With respect to claim 12, Eaves discloses the system of claim 1, further comprising:

a primary inductor (no. 7p in Fig. 1);

a first secondary inductor magnetically coupled to the primary inductor (no. 7s in Fig. 1);

a second switch selectively coupling the first secondary inductor to the string of storage units (no. 16c in Fig. 2a), and configured to transfer energy from the string of storage units to charge the first secondary inductor when the second switch is on (col 13 ln 20-22), and to discharge energy into the primary inductor and charging the individual storage unit when the second switch is off (col 13 ln 22-27).

Additionally, when the second switch mentioned above selectively couples the first secondary inductor to the string of storage units, the circuit will have another switch closed so that there will be a complete connection across the battery cells selected, as can be seen in Fig. 2a.

With respect to claim 13, Eaves discloses the system of claim 12, further comprising:

a first pulse generator (no. 1 in Fig. 1) providing first enable signals to the second switch (no. 2 in Fig. 1, no. 27, 26a, 26c, and 26d in Fig. 3, and col 16 ln 21-37);

the second switch configured to couple the string of storage units to the first secondary inductor (no. 16c in Fig. 2a is coupled to no. 7s in Fig. 1) in response to the first enable signals, transferring energy from the sting of storage units to the individual storage unit (col 16 ln 7-11 and ln 53-56 and col 13 ln 22-27).

Furthermore, the microcontroller acts as a pulse generator because it generates a pulse signal to the MUX and the driver, which in turn force the MOSFET switches of the device to turn on or off and connect the storage unit or units to the inductor.

With respect to claim 20, Eaves discloses the system of claim 1, wherein each storage unit is a storage cell (col 4 ln 25-26 and no. 4a-4d in Fig. 1).

With respect to claim 22, Eaves discloses the system of claim 1, wherein a battery pack comprises a string of one or more storage units (col 4 ln 25-26 and no. 4a-4d in Fig. 1).

3. Claims 1, 18, 19, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Anzawa (US 2002/0109482).

With respect to claim 1, Anzawa discloses a system for balancing state of charge among plural series connected electrical energy storage units, comprising:

a string of electrical energy storage units (no. 1-1, 1-2, and 1-n in Fig. 1); and

a power converter selectively coupled to an individual storage unit of the string (pg 2 para 0016 and 0017), the power converter configured to transfer energy

bidirectionally between the individual storage unit and the string of storage units (pg 2 para 0018 to 0023).

With respect to claim 18, Anzawa discloses the system of claim 1, wherein the power converter comprises:

an up-converter configured to transfer energy from the individual storage unit to the string of storage units (T and inductors near S2 and S1 in Fig. 11); and

a down-converter configured to transfer energy from the string of storage units to the individual storage unit (T and inductors near S1 and S2 in Fig. 11).

Additionally, the transformer of Fig. 11 acts as an up-converter or a down-converter because of the turn ratio difference. When the charge from an individual storage unit is transferred to the capacitor (through the inductor near an individual storage unit to the inductor near S1), the charge will be greater because it is moving from an inductor with less turns to one with greater turns. That charge is then used for the equalization of the other storage units. Furthermore, when the charge from a string of storage units is transferred from the capacitor (through the inductor near S1 to the inductor near an individual storage unit), the charge will be smaller because it is moving from an inductor with more turns to one with less turns. That charge is used for the equalization of the individual storage unit (pg 10 para 184).

With respect to claim 19, Anzawa discloses the system of claim 18, wherein a common transformer serves as the up-converter (T and inductors near S2 and S1 in Fig. 11) and the down converter (T and inductors near S1 and S2 in Fig. 11).

Further explanation for the rejection of claim 19 is addressed above in the rejection of claim 18.

With respect to claim 21, Anzawa discloses the system of claim 1, wherein each storage unit is a battery module having a string of storage units (three battery modules containing three storage units within each in Fig. 3 and pg 7 para 0129).

Allowable Subject Matter

4. Claims 8-11 and 14-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. This was also noted in the previous office action.

Claims 8 and 14 recite a second pulse generator providing second enable signals to the first pulse generator, wherein the second enable signals control the transfer of energy at a controllable rate by controlling the first pulse generator.

The art of record does not disclose the above limitations, nor would it be obvious to modify the art in such a manner.

Response to Arguments

5. Applicant's arguments filed May 19, 2006 have been fully considered but they are not persuasive.

With respect to claims 1-22, applicant argues that Eaves teaches the equalization of cell voltage and not equalization of state of charge and does not provide the bidirectional transfer of energy between an individual storage unit and a string of storage units.

Examiner respectfully disagrees with the applicant for the following reasons: State of charge is directly related to the voltage level of a cell, especially when compared to its maximum

possible voltage level. Eaves does actually use indications of SOC, as noted in col 7, ln 54-65. Also, the applicant is even noted as monitoring voltage, as noted in claim 3 above. Additionally, the recitation of the SOC occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Concerning the bidirectional transfer from an individual unit to a string of units, Eaves discloses such occurrences (as noted in the previous office action and above), including in his abstract (wherein individual access to his cells are provided) and col 18 ln 21-34.

Furthermore, concerning claims 1-22, applicant argues that Anzawa practices voltage equalization, not state of charge equalization, states that equalization is preferably not performed during bulk charge or discharge, and does not allow for the system to target specific cells.

Examiner respectfully disagrees for the following reasons: See above for description of relation of state of charge to voltage level and the occurrence of the SOC in the preamble. Also, stating that equalization is preferably not performed during bulk charge or discharge does not mean that it cannot happen, only that it is not preferred. Additionally, that statement concerns the bulk charge/discharge states, not charge states when a lower current is being drawn or supplied. Lastly, specific cells can be targeted, as noted in para 0016 to 0023 and in Fig. 1. The argument presented by the applicant also has problems because he refers to transferring energy from storage units (not cells) in his claim, and a group of cells can reasonably be considered a

storage unit, as noted in Fig. 3. The rejection, as provided in the previous office action and the current one, reasonably meets the claim language set forth by the applicant.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Piggush whose telephone number is 571-272-5978. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on 571-272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AP

KARL EASTHOM
SUPERVISORY PATENT EXAMINER